REPORT NO. 76-2-18

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EVALUATION OF SOUTHERN PINE BEETLE INFESTATIONS ON THE NATIONAL FORESTS IN TEXAS

U. S. Forest Service
Pineville, Louisiana

U. S. DEPARTMENT OF AGRICULTURE -- FOREST SERVICE
SOUTHEASTERN AREA, STATE AND PRIVATE FORESTRY
RESOURCE PROTECTION UNIT, FOREST INSECT AND DISEASE MANAGEMENT GROUP

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by

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INTRODUCTION

Aerial sketch map surveys were conducted during early June and mid-July 1976 on the National Forests in Texas (657,997 Federal acres) by District personnel. Subsequent ground evaluations were conducted in July by the Alexandria Field Office of the Forest Insect and Disease Management Group. The purpose of the evaluation was to determine the current status of southern pine beetle infestations on the Forest.

The current southern pine beetle outbreak on the National Forests in Texas started in the early 1960's and has fluctuated from endemic to epidemic since that time on the various districts. The current survey indicated epidemic levels of the beetles on the Forest with the San Jacinto and Tenaha Districts having the highest levels of infestation.

METHODS

A 100 percent aerial sketch map survey[2/] of Federal land within protection boundaries of the Forest was conducted by District personnel and was used for the aerial portion of the evaluation. Then, 10 or more spots were ground checked on each of the seven National Forest districts by Forest Insect and Disease Management personnel. A total of 96 spots were examined on the National Forests in Texas.

1/ Entomologist, U.S.F.S., Southeastern Area, S&PF, FI&DM Group, Pineville, Louisiana.

2/ Detection of Forest Pests in the Southeast. 1970. USDA, USFS, SA, S&PF, Div. of FPM, Publ. S&PF-7, Atlanta, Ga. 51 p.

TECHNICAL INFORMATION

Insect - Southern pine beetle, *Dendroctonus frontalis*, Zimm.

Hosts - The southern pine beetle will attack all species of southern yellow pine. However, loblolly pine, *Pinus taeda* L., and shortleaf pine, *P. echinata* Mill., are the preferred hosts.

Type of Damage - Death of the tree is the result of cambial mining by the southern pine beetle as it constructs its gallery. The beetle also introduces blue stain fungi, *Ceratocystis* spp., which slow down or block conduction of water in the stem.

Life cycle of the beetle - The beetles attack, bore through the bark, and construct a winding gallery in the cambium. Eggs are deposited in niches along the sides of the galleries. The eggs hatch into whitish grubs that further mine the cambium and then construct cells in the bark for pupation. The callow adults then mine through the bark to emerge. The complete life cycle takes about a month during the summer, and as many as seven generations may be produced in a year.

RESULTS AND DISCUSSION

Of 897 spots detected from the air on Federal land on all districts, 20.5 percent were singles, 31.1 percent were 2-5 tree spots, 33.7 percent 6-20 tree spots, 10.4 percent, 21-49 tree spots, 2.1 percent 50-99 tree spots, and 2.2 percent 100+ tree spots (Table 1). The San Jacinto District had 32.2 percent of the spots and 63.7 percent of the red and fading trees detected aerially.

Ground data indicated that the San Jacinto District had 55.1 percent of the total southern pine beetle infested trees, the Tenaha District 18.8 percent, the Angelina District, 9.3 percent, the Yellowpine, 6.0 percent, the Neches 4.8 percent, the Raven 3.7 percent, and the Trinity 2.3 percent (Table 2). The number of infested trees per M acres host type ranged from 185.00 on the San Jacinto District to 5.01 on the Trinity District. The total volume of pine timber infested with the southern pine beetle ranged from 571.48 MBF on the San Jacinto District to 39.48 MBF on the Trinity District. Total volume of timber affected ranged from 1,112 MBF on the San Jacinto to 109 MBF on the Trinity and Raven Districts.

The southern pine beetle infestation level on the entire Forest has increased markedly from June 1975 when 3.28 infested trees/M acres host type were reported in FPM Report No. 76-2-1, 1976, as compared to the current level of 54.65 infested trees/M acres host type. The level has increased most dramatically on the San Jacinto District where 4.54 infested trees/M acres host type were reported

Table 1.--Summary of aerial survey data - southern pine beetle evaluation
National Forests in Texas, July 1976

Ownership (District)	Singles	Spot Size (Trees)[1/] 2-5 Spots	2-5 Trees	6-20 Spots	6-20 Trees	21-49 Spots	21-49 Trees	50-99 Spots	50-99 Trees	100+ Spots	100+ Trees	Total Spots	Total Trees
Trinity	2	31	102	28	408	6	155	0	0	0	0	67	667
Neches	52	25	73	65	567	14	445	0	0	0	0	156	1137
San Jacinto	49	78	318	68	899	62	2169	16	1170	17	4400	290	9005
Raven	36	60	258	53	632	5	179	1	60	0	0	155	1165
Angelina	43	62	246	59	798	2	74	0	0	0	0	166	1161
Yellowpine	2	21	62	15	205	1	33	0	0	0	0	39	302
Tenaha	0	2	6	14	109	3	96	2	153	3	388	24	752
TOTALS All Districts	184	279	1065	302	3618	93	3151	19	1383	20	4788	897	14,189

[1/] Data corrected for observer error according to Aldrich and Heller.

Table 2. Summary of results of southern pine beetle evaluation on the National Forests in Texas, (June-July 1976)[1/]

	Ownership Unit (Districts)							
	Trinity	Neches	San Jacinto	Raven	Angelina	Yellowpine	Tenaha	Total
1. Results compiled from data collected during the aerial phase of the evaluation								
Survey type				100 percent Aerial Sketch Map				
Date of Survey	7/22	7/22	6/18	6/18	7/8 & 13	7/20	7/20	
Total acreage surveyed[2/]	81,216	80,435	58,409	99,796	154,392	100,933	82,911	658,092
Total susceptible host type acreage[3/]	81,216	69,934	53,082	91,279	125,738	72,037	70,782	564,068
Total number of spots	67	156	290	155	166	39	163	1,036
Spots/M acres host type	0.82	2.23	5.46	1.70	1.32	0.54	2.30	1.84
Average spot size (trees)	10	7	31	7.5	7.0	7.7	31.3	15.82
Range of spot size	1-30	1-45	1-259	1-60	1-40	1-30	1-200	1-259
2. Results compiled from data collected during ground phases of the evaluation								
Date of ground phase	7/28&29	7/28&29	6/23	6/23	7/20&21	7/29	7/20&21	
Infested trees/M acres of host type	5.01	12.18	185.00	7.27	10.75	14.84	47.51	54.65
Total number of infested trees within survey boundary	407	852	9,853	664	1,660	1,069	3,363	17,868
Ratio of green infested to total red and fading trees	1:2	1:2	1:0.99	1:0.41	1:1	1:3.5	1:0.95	1:1.6
Total volume of infested trees (MBF)	39.48	53.25	571.48	43.16	231.57	134.16	343.03	1,416.13
Total volume of affected trees (MBF)[4/]	108.64	121.50	1,112.09	109.07	321.25	174.32	607.10	2,553.97

1/ Data corrected according to Aldrich and Heller.

2/ Includes Federal land only.

3/ Acreage with 25 percent or more pine was considered host type.

4/ Affected volume includes trees (grey, red, fading, green) that are dead or dying as a result of southern pine beetle attack.

in 1975 as compared to 185 infested trees/M acres host type at present. The next highest infestation level was on the Tenaha with 47.51 infested trees/M acres host type. Total volume currently infested on the Forest is almost 8 times that reported in June 1975 (1416.13 MBF in July 1976 compared to 169.58 MBF in June 1975). Actually, the 1976 volume infested is probably more than 8 times greater than that found in 1975, since private land within the protection boundary was included in the 1975 survey but was not included in the 1976 survey.

The southern pine beetle is presently at epidemic levels on the National Forests in Texas and is especially severe on the San Jacinto District. Most infestations are extremely active as indicated by the large numbers of green trees with heavy southern pine beetle brood present. These factors indicate a continued upward trend in the infestation level of the southern pine beetle on the Forest, at least through the remainder of the summer. Parasites and predators of southern pine beetle were active; however, the total effect of these on southern beetle population dynamics has never been determined. This beetle has a very high biotic potential for increase. If conditions remain favorable for its development, it can cause even more widespread losses the rest of this season and next.

RECOMMENDATIONS

1. Southern pine beetle control measures, as outlined in the Forest's Southern Pine Beetle Control Plan, should be intensified in order to minimize losses.

2. Suppression efforts should be concentrated in heaviest areas of beetle activity.

3. Outbreak status will be monitored by FI&DM personnel throughout fall and winter 1976-77. Additional evaluations will be made as conditions warrant. The next scheduled evaluation will be made in the summer of 1977.

REFERENCES

Aldrich, R. C., R. C. Heller and M. F. Bailey. 1958. Observation limits of aerial sketch mapping southern pine beetle damage in the southern Appalachians. J. For. 56(3):200-203.

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